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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/098,569	03/18/2002	Ryuji Biro	03500.016291	3198

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EXAMINER	
PADGETT, MARIANNE L	

ART UNIT	PAPER NUMBER
1762	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/098,569	Applicant(s) Ryuji Biro et al
	Examiner M.L. Padgett	Group Art Unit 1762

—The MAILING DATE of this communication appears on th cover sheet beneath the correspondence address—

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, such period shall, by default, expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

☐ Responsive to communication(s) filed on (27) 4/28/03.

☐ This action is **FINAL.**

☐ Since this application is in condition for allowance except for formal matters, **prosecution as to the merits is closed** in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 1 1; 453 O.G. 213.

Disposition of Claims

☒ Claim(s) 1-8 is/are pending in the application.

Of the above claim(s) 1-6 is/are withdrawn from consideration.

☐ Claim(s) ______ is/are allowed.

☒ Claim(s) 7-8 is/are rejected.

☐ Claim(s) ______ is/are objected to.

☐ Claim(s) ______ are subject to restriction or election requirement

Application Papers

☐ The proposed drawing correction, filed on ______ is ☐ approved ☐ disapproved.

☐ The drawing(s) filed on ______ is/are objected to by the Examiner

☐ The specification is objected to by the Examiner.

☐ The oath or declaration is objected to by the Examiner.

Pri rity under 35 U.S.C. § 119 (a)-(d)

☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119 (a)-(d).

☐ All ☐ Some* ☐ None of the:

☐ Certified copies of the priority documents have been received.

☐ Certified copies of the priority documents have been received in Application No. ______.

☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a))

*Certified copies not received: ______.

Attachment(s)

☒ Information Disclosure Statement(s), PTO-1449, Paper No(s). 3

☒ Notice of Reference(s) Cited, PTO-892

☐ Notice of Draftsperson's Patent Drawing Revi w, PTO-948

☐ Interview Summary, PTO-413

☐ Notice of Informal Patent Application, PTO-152

☐ Oth r ______

Office Action Summary

1. Applicant's election with traverse of group II method claims 7-8 in Paper No. 7 is acknowledged. The traversal is on the ground(s) that the product claims (apparatus) and the process of its use are commensurate inscope. This is not found persuasive because the previously made argument that the apparatus may be used for other processes, such as opening the pressure control means prior to ionization remains true and unrefuted. Applicant's request for rejoinder of claims upon allowance of the process-of-use claims is noted, and will be considered and depend in the two sets of claims being commensurate in scope such a time, however it is allowable products that make processes of making or using them allowable, not the other way around.

The requirement is still deemed proper and is therefore made FINAL.

2. Claims 7-8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 8 of claim 7 "the plasma" lack any antecedent basis, and while like language is found on p. 4 of the specification, and in original claim 1, the figures are not commensurate in scope with or do not depict the described configuration. Where or what is the source of the plasma, which is claimed as the "ionization means"? In order for the remote ionization means to use "the plasma" to cause ionization of a source gas, that plasma (and its ions) itself must be formed somewhere, so applicants appear to have claimed <u>as written</u> a plasma source remote to the remote ionization means. On the other hand, applicant's figure 1, would appear to provide two possible ionization means (microware power source 8 and high frequency power source 10), which may ionize input reaction chamber gas from feed 34, and <u>thus</u> form a plasma remote from film forming chamber 2, but this in NOT what is claimed!

Claim 7 also contains language that is relative and/or non-ideomatic English, such as "to come into a thin film" on lines 5-6, and "coming short" in line 8. The specification was reviewed for a definition to define the scope of "short", but none was found (its used through out the specification, i.e., p. 1, 4, 8, etc., but not define). Use of relative terms that lack clear metes and bounds either in the claims, or in a clear definition in the specification or relavent cited prior art, is vague and indefinite.

The examiner guesses that "coming short" is intended to some how refere to deficiencies in the stoichiometry of the deposite in the thin film formed from the vapor deposited deposition material, however that film has no necessisary or defined stoichionetry, so it can's be "short" of any unspecified component thereof. The vapor deposit may be of a pure metal, and no possible meaning of "coming short" has any logical meaning or significance with respect to such a scope of meaning. Thus, non-idiomatic phrasing aside, how or in what way the source gas ionized in the reaction chamber is intended to compensate for something in the thin film deposition, is unclear for the claims as written.

3. Except where they cause significant confusion or problems, the examiners have been instructed to no longer reject antecedent basis, grammar errors, etc, which were formerly rejected, however applicants might want to consider changing "an ionized source gas" (line 15, claim 7) to show the antecedent basis from the previous line, and "a vapor" in claim 7, line 17, to show its basis from line 4, for the sake of clarity.

4. The disclosure is objected to because of the following informalities: The specification needs proof reading, especially for non-idiomatic English problems as described in the claims in section 2, above.

Appropriate correction is required.

5. The art cited in the IDS of paper # 3 is made of record, but none of the references appear to have any teachings concerning ionization means/systems as either intended or claimed.

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harano et al or Iacovangelo et al in view of Pinkhasov (4,609,564).

Both Harano et al (abstract; figures 1, 3, 7, etc; col. 3, lines 9-32 and 58 - col. 4, lines 19 & 35-61; col. 6, lines 4-66; col. 7, lines 11-55; col. 8, lines 1-21, and Examples on col. 10-13) and Iacovangelo et al (abstract; figures 1-5, 7, 8 and 10; col. 3, lines 25-60; col. 4, lines 20-45; col. 5, lines 17-42; col. 7, lines 7-37 and 49 – col. 8, line 22^+ and line 61 - col. 9, line 57^+, esp. lines 39-57 use of Ar + O_2 in the plasma chamber and higher pressure therein than in the deposition chamber; col. 11, lines 9-39; col. 13, lines 45-62 and Examples in col. 14-16), teach deposition of films using vacuum evaporation techniques in the deposition chamber, while plasma is produced remotely via an arc discharge process. A pressure differential is maintained between the two chambers, such that the plasma chamber uses higher pressure than deposition chamber. Iacovangelo et al teach the possibility of supplying oxygen in the plasma chamber or immediately at its exit into the deposition chamber, such that the reactant gas such as oxygen is excited and reacts with the vaporized material (metal) to form thin film deposits. Harano et al similarly inputs reactant gases, such as O_2 via input 12 when disclosed, and generally inputs inert gases into the plasma chamber, with discussion of how Ar verse He effects the processes and what pressure is most desirable for producing desired film

characteristics. While it is noted that the type of gas and where it is input will read on applicant's claims as <u>presently</u> written, it is suspected that Iacovangelo et al's input of O_2 directly into the plasma chamber may be what is intended, since volatile components of compounds (i.e., oxygen, etc) will frequently fall short of their stiochrometric ideal, unless supplied in excess, or in a more energetic or excited form. Applicants' claims hint at such concepts in an out of context and non-idiomatic fashion, with the "compensating atoms coming short...", but make no clear claim thereof.

While both Iacovangelo et al and Harano et al teach pressure differentials in the relative proportions or differences of claim 8, neither teach the specific values claimed, with Iacovangelo et al providing no ranges, and Harano et al teaching pressures for the film forming chamber of P $\geq 3x10^{-4}$ torr, preferably $3.0x10^{-4}$ to $3.0x10^{-3}$, which is also taught to be variable according to the gas used, and is on the order of applicants' claimed limit of P (film chamber) $\leq$ 13 in Pa $\approx$ $1.3x10^{-4}$ torr. On col. 3, lines 58^{+} for the teachings on the pressure gradient plasma generating apparatus pressure of about 1 torr were noted for the cathode region, which is higher than the claimed 0.3-7 Pa (i.e., about $2x10^{-3}$ to $5x10^{-2}$ torr). It would have been obvious to one of ordinary skill in the art to apply the differential pressure teaching of either Harano et al or Iacovangelo et al, which optimization depending on the specific gases employed, and/or the desired characteristics of the deposited film, especially as in Harano et al col. 6, it is seen that by use of different inert gases, Ar or He, same pressures used therewith can produces different stress characteristics in the deposit, such that the use of different gases require different optimizations. It must also be considered that exactly what the present claims are depositing is less than clear, as discussed above in section 2.

Harano et al & Iacovangelo et al differ from the claims in that while inherently they have pressure control means to create their taught differential pressures, they do not discuss

"opening the pressure control means ... to introduce an ionized source gas ..." Pinkhasov in Fig. 6, discussed on col. 7, line 30- col. 8, line 32, teach vacuum arc plasma devices, where the substrate is in a separate chamber from the plasma arc apparatus, that uses a vacuum lock (538), that is opened to allow the excited vapors from the chamber to pass onto the substrate 510, at least in part due to the differential pressure, which is maintained by controlling valve 535. As either Harano et al or Iacovangelo et al are inputting their arc plasma into the deposition chamber via the pressure differential, analogously to Pinkhasor, but provide little discussion of means therefore, it would have been obvious to one of ordinary skill in the art to apply means as employed in Pinkhasor to control flow and pressure of the plasma to those times it is required for the taught deposition processes, because it is seen to be an old and well known process that is effective for the taught situation in the primary references, that do not provide a detailed means of achieving their differential pressure teachings.

8. Andra and the Japanese patent to Sasagawa et al, teach processes analogous to the above primary references, with Sasagawa et al teaching pressure like those in Harano et al, while pressures of Andra (abstract; Fig. 1; col. 6) are overall lower than either applicants' claimed ranges or Harano's ranges, providing cumulative evidence of the above stated obviousness of values due to optimization. Also note teaching in Andra concerning, reference # 7 or 10 being "differential pumping diaphragms", but no explanation on what means provide or maintain the taught different pressures. Sakemi et al is like the primary references, but has less detail on pressure gradients.

9. Claims 7-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeLozanne in view of Noda et al, or visa versa.

DeLozanne (Abstract; Fig. 1; col. 3, lines 28- col. 4, line 8 and claims 1, 6, 7) teaches use of vacuum evaporation to deposite oxide superconductors, where oxygen plasma is

simultaneously directed at the deposit, and differential pressures are employed. The substrate and vapor source are in communicating chambers with separate evacuation systems, but no obstical between the vaporized material and substrates. The plasma source is from nozzles 28, where the plasma is created inside the nozzle via RF coils wrapped around the nozzles, thus effectively creating separate chamber from the deposition chamber. The pressure in the nozzles while not specifically disclosed, must be above the 1 mtorr (10^{-3} torr) it produces after leaving the nozzle chamber to expand into the deposition chamber 18 at substrate 20's surface. DeLozanne differs from the claims by not discussing any openable control means discussed with respect to the plasma chamber, although while separate chambers are discussed for the substrate and evaporation sources of DeLozanne, as there is a relatively wide opening there-between and no means of closing them off from each other, they might be considered equivalent to applicants' film forming chamber, with a gradient present within the overall chamber.

Noda et al (abstract; figures 1, 3-6; col. 2, line 48 - col. 3, line 16 and line 47 - col. 4, line 61^{+}) is also depositing oxide superconductor thin films, that may be formed via, vacuum vapor deposit from sources in the same chamber, where oxygen plasma produced in a pipe, via plasma means that may include an RF coil wrapped thereround (Fig. 1), and which employ pressure control values, is input at the surface where the vapor deposits. Noda et al do not discuss differential pressures, however their configuration is analogous to that of DeLozanne, but without the dividing wall with opening between vapor sources substrate. It would have been obvious to one of ordinary skill in the art to employ values as discussed in Noda et al to control plasma flow from the nozzles of DeLozanne, i.e., opening and closing valves to start and stop plasma flow, because while not discussed, one of ordinary skill would expect to be able to turn ON or OFF their plasma inorder to be able to apply it as taught. Alternatively, it would have

been obvious to employ differential pressures in Noda et al, as taught in DeLozanne, as their configurations are analogous, so as to have the lowest pressures where the evaporation processes are occurring inorder to achieve the advantages of optimizing for the particular technique at the local it is occurring, as taught in DeLozanne. Specific pressures employed, would again be optimized according to particular apparatus and reagents employed, hence lack significance without sufficient context.

10. Okamoto et al, Yasunaga et al and Hyman, Jr. et al, have further teachings of interest concerning plasma employed simultaneously with vacuum vaporization techniques, but do not appear to discuss differential pressures.

11. Any inquiry concerning this communication should be directed to M L. Padgett at telephone number 703-308-2336 on M-F from about 8:30 am - 4:30 pm; FAX # (703) 872-9310 (regular); 872-9311 (after final); and 308-6078 (informed).

M. L. Padgett/mn 6/13/03
July 2, 2003

Marianne Padgett
MARIANNE PADGETT
PRIMARY EXAMINER